USAF OEHL REPORT

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OEHL-82

ON-SITE SURVEY TO EVALUATE DDT CONTAMINATION IN TABBS CREEK

LANGLEY AFB VA

JULY 1983

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During Phase II—Field Confirmation Study of the Installation Restoration Program for Langley AFB, Virginia, a notable DDT contamination was reported for a sediment sample taken in Tabbs Creek where Gregg Road crosses the creek. An extensive biological, soil and sediment sampling plan was completed on 30 November 1982. Only one sediment sample contained DDT levels of note, approximately 25 µg/g (ppm). Biological samples collected downstream from the site of DDT contamination did not contain detectable levels of DDT, or → over

micrograms/gram

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contained only very low levels that do not exceed background levels of DDT found in fish, crab and oysters from other locations in the U.S. The DDT present in the isolated stream sediment has not and is not expected to result in hazards to human health, violation of stream water quality standards or be detrimental to the environment. It is recommended that the isolated area be left undisturbed and no further action be taken.

NOTE: This issue was addressed in USAF OEHL Consultative letter, 83-122EC101CPB, dated 29 Mar 83.

Report No. 83-225EC101GPB

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ON-SITE SURVEY TO EVALUATE DDT CONTAMINATION IN TABBS CREEK LANGLEY AFB, VIRGINIA

JULY 1983

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I. INTRODUCTION

As part of the Department of Defense (DoD) Installation Restoration Program (IRP), Phase II Field Confirmation Study at Langley AFB, Virginia, conducted between October 1981 and February 1982, a sediment sample was found to contain a notable level of the pesticide dichloro-diphenyl-trichloroethane (DDT). This sediment sample was taken in Tabbs Creek immediately east of a culvert passing under Gregg Road and was found to contain elevated levels of DDT and its isomers (see Table 1). These levels were found upstream of landfill sites which indicates that the landfills are not the source (2). Some contamination of overlying waters was evident in upstream samples, but no DDT was detected in water samples downstream of the landfills (2). Before an informed decision could be reached concerning the necessity, if any, for remedial action, additional data were requested to define the extent of contamination both in area and depth.

Table 1

Results of Analyses of Sediment Sample Collected from Tabbs Creek

Parameters	Sample Station Number 4
o,p' DDE	3.3 mg/kg*
p,p' DDE	32.0 mg/kg
o,p' DDD	31.0 mg/kg
p,p' DDD	89.0 mg/kg
o,p' DDT	66.0 mg/kg
p,p' DDT	350.0 mg/kg

*mg/kg, dry weight = parts per million (ppm)

The authors of this report from the USAF Occupational Environmental Health Laboratory (USAF OEHL) conducted a sampling survey in and along Tabbs Creek on 30 November 1982. Results were reported in USAF OEHL Consultative Letter, 83-122EC101CPB, dated 29 Mar 83. The survey was designed to be a limited scope study to try and pinpoint the source of the DDT contamination and provide information on the degree of contamination in downstream soil, sediment, and biological samples.

II. SAMPLING METHODOLOGY

Due to the limited scope of this survey, it was planned to sample upstream from the suspected source and downstream as far as possible without launching a boat and taking dredge samples. The major effort concentrated in and around the previously identified contaminated area. The sampling points are shown on the map in Figure 1. At each location, three separate soil or sediment samples were collected using a long-handled spade going full depth of the

spade (12"), thoroughly mixed, and a composite subsample placed in a clean 4-oz widemouth sample jar. The sample jar mouth was covered with aluminum foil and the lid screwed on. Each jar was identified by site of collection, content, and date of collection. The biologicals were collected by using a minnow trap for fish and crab traps for crabs. The oysters were collected at low tide under the bridge on Worley Avenue. The control oyster sample was purchased at a local market. The fish and crabs were individually frozen and placed in a sample jar as a single composite sample. The oysters were shucked and placed in a sample jar and frozen. All biological sample jars were covered with aluminum foil before placing the lid on the jar. They were identified by site, content, and date of collection. Three additional sediment samples were collected by the bioenvironmental engineer at Langley AFB on 18 May 1983. These were single samples collected at the surface, six inches and twelve inches below the surface at site number 4.

III. RESULTS AND DISCUSSION

The analytical results are presented in Attachments 1 and 2. The only sample of concern from the November sampling is sediment sample (SED 4) which indicates that a source of DDT contamination exists immediately on the east side of the culvert (approximately 25 feet east of the end of the culvert, midstream) at Gregg Road and Tabbs Creek, the o,p'-DDT level being 5.70 µg/g (ppm) and the p,p'-DDT level being 19.0 µg/g (ppm). The May 1983 sampling had o,p'-DDT levels of 7.3 µg/g (ppm) at the surface, 6.4 µg/g at a six inch depth and 8.8 µg/g at the twelve inch depth. The p,p'-DDT levels from the same sampling had 17.0 µg/g at the surface, 12.0 µg/g at a six inch depth and 58 µg/g at the twelve inch depth. [The formula used to determine total DDT equivalent = (o,p'-DDT + p,p' DDT) + 1.114 (o,p'-DDD + p,p'-DDE + o,p'-DDE) from reference (1).] When the inherent variability of environmental sampling is taken into account, these results are not considered remarkably different from previously reported results. One must consider that (1) samples were taken several months apart, (2) two samples cannot be taken from a precisely identical location, and (3) the reported levels are so low that a very small amount of DDT picked up in one sample and not in another could account for the difference.

In personal conversations with a representative of the U.S. Environmental Protection Agency (EPA), Enforcement Division, it has been reconfirmed that no limits have been set for DDT levels in stream sediments. The Food and Drug Administration (FDA) action level for DDT in fish tissue is 5 ppm. Levels higher than 5 ppm can result in closing of the fishery. To keep fish tissue levels below 5 ppm, sediments should not exceed 10-100 ppm DDT. Once DDT is in the sediments it is very stable; i.e., 3000 ppm in sediments may result in only 1 ppm in the water. When the organic matter is abundant in the sediment DDT binding to the sediment is enhanced. If the water becomes acidic; i.e., high levels of tannic acid associated with large amounts of vegetation as in a swamp, then DDT will be found in higher levels in the water (3).

There is a small and specific area in the creek bottom that contains a level of DDT in the sediment that is higher than the level seen in background samples. This creek bottom at the site of contamination is not covered with water at all times during the year. The creek at Gregg Road is, in fact, a ditch carrying surface water runoff. It does not afford a breeding area for fish. The immediate surroundings are not swampy nor do they contain large amounts of decaying organic matter. All of these statements support the opinion that at this location DDT has an enhanced environment for partitioning, i.e., binding to the sediment. Biological samples collected downstream from this site do not contain detectable levels of DDT or contain only very low levels that do not exceed background levels found in some fish, crab and oysters from other locations in the U.S. (1).

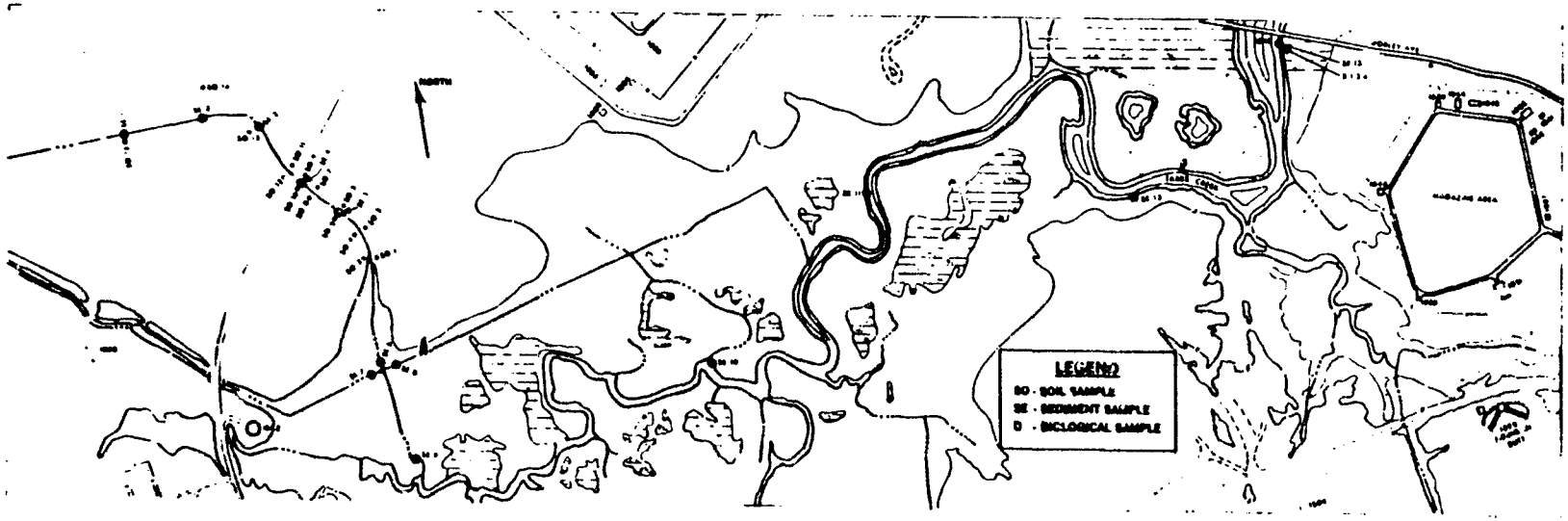
The variability in results and the extent of the sampling conducted by the USAF OEHL confirm that the area of contamination is very small. If any inferences can be drawn from the differences in the two results, it is that the level is lower now than it was before.

IV. CONCLUSIONS

The level of DDT present in these downstream samples of soil, sediment and aquatic life has not and is not expected to result in hazards to human health, to violate the stream water quality standards, or to be detrimental to the environment.

V. RECOMMENDATION

No further action is required.



DOT SAMPLING POINTS IN TABBS CREEK — LANGLEY AFB VA — 30 NOV 1982

Figure 1. DOT sampling points in Tabbs Creek - Langley AFB VA - 30 Nov 82

REFERENCES

1. DDT - A Review of Scientific and Economic Aspects of the Decision to Ban Its Use as a Pesticide. U.S. Environmental Protection Agency, Washington DC:1975

2. Installation Restoration Program For Langley AFB, Virginia: Phase II - Field Evaluation. Water and Air Research, Inc., Gainesville, Florida: 1982

3. United States Environmental Protection Agency, Enforcement Division, Washington DC: 1983 personal communication

ATTACHMENTS

BIOSPHERICS INCORPORATED

1 MAR

FINAL REPORT

Analysis of Biological and Soil Samples for Residues of DDT and its Isomers*

Method for Biological Samples: AOAC Methods, 13th Ed., 1980, Sec. 29.
Method for Soil Sediment Samples: EPA-600/80-038 (6/80), Sec. 11,B

Detection Limit for each DDT Isomer = 0.0050 ppm (µg/g)

BIOS #	Client ID	o,p'-DDE	p,p'-DDE	o,p'-DDD	p,p'-DDD	o,p'-DDT	p,p'-DDT
G-14462	BIO 1	0.068	ND[1]	0.081	0.012	0.24	ND
G-14463	BIO 2	ND	ND	ND	ND	ND	ND
G-14464	BIO 3	0.025	ND	0.034	0.019	0.045	ND
G-14465	BIO 4	0.68	ND	0.022	0.0081	0.50	0.0025
G-15566	SED 1	ND	ND	0.035	ND	ND	0.012
G-15567	SED 2	ND	ND	0.037	ND	0.0093	0.037
G-15568	SED 3	ND	ND	0.024	ND	0.0082	0.026
G-15569	SED 4	0.55	0.41	2.3	0.65	5.70	19
G-15570	SED 5	ND	ND	0.011	0.011	0.022	0.043
G-14471	SED 6	ND	0.041	0.91	0.014	3.7	1.2
G-14472	SED 7	ND	0.028	0.48	0.014	1.7	0.21
G-14473	SED 8	ND	0.018	0.044	ND	0.088	0.10
G-14474	SED 9	ND	ND	0.45	0.034	0.36	ND
G-14475	SED 10	ND	ND	0.34	0.024	0.46	ND
G-14476	SED 11	ND	ND	0.38	0.016	0.39	0.30
G-14477	SED 12	ND	0.0088	0.10	0.048	0.40	0.14
G-14478	SED 13	ND	0.029	0.078	0.0087	0.22	0.19
G-14479	Soil 1	ND	ND	ND	ND	ND	ND
G-14480	Soil 2	ND	ND	ND	ND	ND	ND
G-14481	Soil 3	ND	ND	ND	ND	ND	ND
G-14482	Soil 4	ND	ND	0.0082	0.0045	0.0068	0.016
G-14483	Soil 5	ND	ND	ND	ND	ND	ND
G-14484	Soil 6	ND	ND	ND	ND	ND	0.0062
G-14485	Soil 7	ND	ND	ND	ND	ND	ND
G-14486	Soil 8	ND	ND	ND	ND	ND	0.0053
G-14487	Soil 9	ND	0.0063	0.015	0.023	0.031	0.11
G-14488	Soil 10	ND	ND	ND	ND	0.0048	0.035
G-14489	Soil 11	ND	ND	ND	ND	ND	0.018
G-14490	Soil 12	ND	0.011	0.0089	0.14	0.036	0.91
G-14491	Soil 13	ND	ND	ND	ND	ND	0.010
G-14492	Soil 14	ND	ND	0.014	0.0067	0.015	0.027
G-14493	Soil 15	ND	ND	ND	ND	ND	0.015

[1] ND - Not Detected.

*Results based on dry weight of soil.

BIOSPHERICS INCORPORATED

FINAL REPORT

Analysis of Sediment Samples for DDT Residues

Client: Brooks AFB

BIOS #:	G-6072	G-6073	G-6074	
Client ID:	GS-83-0223 Surface Sediment	GS-83-0224 Sediment at 6 inches	GS-83-0225 Sediment at 1 foot	Detection Limit
	ppm µg/g	ppm	ppm	ppm
o,p'-DDE	ND[1]	ND	ND	0.010
p,p'-DDE	0.30	0.34	0.59	0.010
o,p'-DDD	2.3	2.9	8.3	0.010
p,p'-DDD	1.2	1.1	12	0.010
o,p'-DDT	7.3	6.4	8.8	0.010
p,p'-DDT	17	12	58	0.010
% Moisture	28.2	18.1	12.9	

NOTE: Levels reported are based on wet weight.

[1] Not Detected

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